

## HAYES, SEAY, MATTERN & MATTERN, INC. (HSMM) Comparable Projects

Like GEO Design Services, Inc. and Hensel Phelps, HSMM has extensive experience in corrections/ detention projects.

**Rivers Correctional Institution  
Low-Security Male Prison  
Winton, North Carolina**



Rivers Correctional Facility is a privately operated 1,450-bed low-security male correctional facility located on 257 acres in Hertford County, two miles west of Winton, North Carolina. To meet the end user's critical need for housing inmates, the end user contracted for an 11-month design/build schedule. The notice to proceed was given on March 7, 2000 and the Certificate of Occupancy was issued January 31, 2001 beating the contract schedule.

HSMM provided comprehensive architectural and engineering services to include mechanical, electrical, plumbing, civil and structural. The firm was a subconsultant to **Hensel Phelps Construction Company**, and both worked for the Owner/Operator, **The GEO Group, Inc.**

This low security prison was built to medium-security standards. It is designed as a "campus" setting of single story buildings and includes four general housing units, a special housing unit, a gymnasium/programs building, support building, administration building, industries building, four guard towers and a gatehouse. The total area of the campus is approximately 343,750 sf. An exception to the single story setting are the special housing and inmate housing units that are one-story with a mezzanine to accommodate two-tier stacking of inmate cells.

Due to the fast track nature and security requirements of the facilities, two primary methods of construction were utilized; precast concrete and pre-engineered metal building systems. The general housing units, special housing

units, support building and the programs area are constructed of precast concrete wall and roof panels. Precast modular cell units are utilized for the general and special housing units. The precast construction complies with Type A, Federal Bureau of Prison (FBOP) requirements. Type A precast construction requires the use minimum 4-inch thick, 5000 psi minimum concrete reinforced with W4 welded wire fabric at 4-inches on center each way. The less secure areas, such as the industries, gymnasium and administration buildings are pre-engineered metal building construction, with precast exterior wall panels to approximately 16'-feet above grade, the remainder of the wall height are metal panels. The roofs for the pre-engineered buildings are standing metal seam. Where individual areas required security rated construction, either BOP Type A or Type B CMU walls are provided. Type A CMU walls require 8-inch CMU with No. 4 rebar located 8-inches on center each way with 3000 psi grout. Type B walls only require the rebar 8-inches on center in one direction. In some areas precast cap slabs, constructed to Type A requirements, were used to top the individual secure areas. Non-secure interior partitions are typically CMU or gypsum wall board (GWB).

The entire campus, with the exception of the administration building is enclosed by double rows of security fencing constructed to FBOP security standards. Four elevated guard towers guard the perimeter. Access to the compound is gained adjacent to the central control station in the administration building or through the secure vehicle sally port. Physical security within the buildings is accomplished by utilizing FBOP standard construction methods. Secure walls within the facility typically are constructed of reinforced CMU, Type A or B Doors and windows located in these secure walls are special security rated components designed and installed to provide a security level consistent with the wall construction. Ductwork penetrations through rated wall construction are provided with security bars. Security locks and control systems maintain secure access to these areas. 141 closed circuit TV cameras monitor the buildings and campus.

The administration building is approximately 15,400-square-feet and houses the day-to-day administration and security operations required for the facility. Administrative offices for the Owner and the FBOP are located within the building. The primary Central Control area for security systems and is housed within the administration building. The Security Officers can monitor and control the security systems inside the compound from this remote location outside of the security perimeter.

The support building, approximately 53,000-square-feet, houses inmate support functions within the secure perimeter. Areas for visitation, medical services, inmate intake/holding, additional staff offices, property storage, laundry, kitchen and dining, and maintenance areas are located within the support building.

An approximately 44,300-square-foot industries building is provided for inmate work programs. The industry building is provided with utility services to support a light-manufacturing environment.

The programs/gymnasium building is approximately 25,500-square-feet and houses the education and activities areas. Ten classrooms, a computer room and a central and legal library are provided in the programs area. A gymnasium, chapel, barbershop and commissary are provided in the gymnasium portion. Exterior covered patios are provided for outdoor activities adjacent to the outdoor recreation area.

Four two-level general housing units, approximately 47,700-square-feet each, are provided. Each unit is designed to accommodate 330 inmates. The units are divided into five pods, each containing a central dayroom. A centrally located, elevated housing control room allows continuous manned and automated security monitoring of the inmates in each housing unit. Each housing unit has its own support area which houses the inmates records, provides meeting rooms for counseling, staff team meetings and a medical exam room to reduce unnecessary trips out of the secure housing unit to the support medical area. Correctional staff can control the facility housing unit security system (locks and cameras), water, lights and HVAC from the housing control room

A single special housing unit with 65 cells and approximately 13,100-square-feet is provided. The unit is composed of two pods, each with a dayroom and two levels of cells. An outdoor, security enclosure is provided for limited outdoor

recreation activities. A central elevated control room allows continuous manned and automated security monitoring of the inmates. The correctional staff has the same level of control from the control room as in the General Housing units.

Covered walkways connect all buildings within the secure compound. Basketball, soccer and baseball fields are provided within the secure perimeter. A larger outdoor recreation area is provided behind the programs/gymnasium building.

The heating, ventilating and air-conditioning systems are controlled by a central direct digital control system. Three emergency generators provide back-up power for heating, security and life safety systems.

Development of the rural site required careful coordination and planning with various government agencies. The site contains numerous wetlands that required boundary mapping and identification. Due to the fast track nature, it was very important to site and construct the facilities to minimize impact on the wetlands. Water and sewer systems were not available to the site at the time of construction. The governmental agencies were completing their design of the supporting sewer and water systems at the same time as the prison facility was being designed. During the design phase required capacity information was exchanged to coordinate the facility's systems with the government's systems. An elevated water tank was provided on site to increase the water pressure and capacity available from the government system. Sewage treatment and connection requirements were coordinated to allow sewer tie-in to the government sewer system.

HSMM received a PCI *Certificate of Special Recognition* for the outstanding use of precast, prestressed concrete components in the project.

Completion Date: 1/31/2001

Construction Cost: \$54,756,251

### **St. Brides Correctional Facility, Phase II Chesapeake, Virginia**

Chesapeake's St. Brides Correctional Facility is a medium-security facility owned and operated by the Virginia Department of Corrections (VDOC). KBR commissioned HSMM to provide architectural and engineering services for Phase II of the facility under a design-build contract for the VDOC. Additionally, HSMM is providing consulting services for security electronics and hardware, and hired sub-consultants to design security hardware and provide geotechnical investigations. HSMM is also providing construction administration services.

Phase II will include a new 93,480-square-foot housing and programs building, as well as a 10,000-square-foot maintenance building. The housing and programs building will consist of eight dormitory/dayrooms and offer capacity for 704 inmates. An attached segregated housing module offers space for 24 additional inmates in pre-fabricated steel, single cells.

The new housing building will be located adjacent to existing Phase I buildings, creating a quadrangle layout. This layout will result in a shared prison yard and outdoor activity area for inmates. Other common areas will include a gymnasium; indoor activity areas; administrative and counseling offices; barber and nurse rooms; laundry facilities; and mechanical, electrical, and security rooms.

The housing and programs building will be constructed with tilt-up concrete wall components, and the maintenance building will be a pre-engineered metal structure consisting of four vehicle bays, shop areas, offices, and a classroom.

A curved wiring hood on dormitory divider walls will house electrical and television connections to the dormitory rooms.

Special design considerations will address the need for Phase II buildings to withstand Category 3 hurricanes.

Completion Date: December 2007 (estimate)  
Construction Cost: \$24,000,000 (estimate)

**U.S Penitentiary and Federal Prison Camp  
Federal Bureau of Prisons  
TUCSON, ARIZONA**



The U.S. Penitentiary and Federal Prison Camp (USP/FPC) in Tucson, Arizona is a \$112 million, fast-track design-build project. The U.S. Penitentiary (USP) is a high security institution with living and support facilities for 960 inmates with a gross building area of 59,000 square meters. The Federal Prison Camp (FPC) is a minimum-security institution with living and support facilities for 128 inmates with a gross building area of 3,000 square meters. Most of the facilities are constructed of precast or tilt-up concrete. Sophisticated secure electronic systems are used.

More than 25 structures were built for the U.S. Penitentiary, including six (6) interconnected general inmate housing units and one (1) special housing unit. The Federal Prison Camp includes one housing unit and a support building. Providing support for both facilities is a central utility plant, an inmate systems management building, an administration building, and other assorted buildings.

The design-build scope of work includes all architectural, engineering, construction, and other related services necessary to provide a new federal correctional facility. HSMM teamed with a local architectural firm, Arrington Watkins (AW), under contract to the construction contractor, Dick Pacific. HSMM provided project management services; co-architectural and civil lead design services; complete structural, mechanical and electrical design services; and construction administration.

The team's division of work was designed to make the best use of each firm's expertise. Due to its experience in security, knowledge of constructability and skill in construction sequencing, AW designed the project's housing units. HSMM designed those buildings that required more intensive engineering and architectural coordination, and led

engineering efforts for the USP core and the FPC. AW used its pre-engineered building expertise to design the shared warehouse and the garage/landscape building.

Construction began in early 2003, following approximately six months of design work. Construction was completed in April 2005. Construction began with the central utility plant, followed by the housing structures.

The design and construction meet the desert region's special requirements, incorporating systems designed to reduce energy consumption and provide lower operating costs, employing green building materials and systems, while responding to the unique architectural design characteristics of the area.

FBOP's requirements include a uniform and straightforward design, with a more secure area inside a perimeter fence and a less secure area outside. HSMM was required to stay within FBOP's strict guidelines, while providing design enhancements and construction technology improvements. Inside the perimeter fence, all materials meet FBOP Technical Design Guidelines for security and reinforced precast concrete and masonry and heavy gauge metals were primarily used. Outside the fence, the materials and finishes are similar in appearance to the more secure buildings inside, while being slightly less massive. This allows the buildings in the complex to stay consistent, while massing, size, location and fenestration easily demonstrate the facilities' distinct functional areas.

Construction materials used provide a low life cycle cost; are durable and low maintenance; use "green" building materials wherever possible; and provide cost-effective performance through design and construction collaboration.

Concrete construction was selected for most of the walls in the complex. Modular, pre-cast insulated concrete cells with non-cantilever and cantilevered balcony floors and ceilings were used for construction of all general housing and special housing units.

An innovative approach was taken toward the design of the prototypical general housing unit roof configuration by combining the structural and security-rated abilities of structural pre-cast tees and the ability of the re-roof framing system covered by decking, insulation and membrane roofing to form an accessible roof area. The pre-cast tees provide a secure, clear span flat roof/ceiling structure over dayroom spaces in each housing unit and the metal re-roof system creates the sloped roof massing for the housing unit. The pre-cast tees allow for a column-free dayroom space that enhances visibility for security.

## **MATERIALS**

### **Cell Modules**

Cells were constructed of pre-cast concrete cell modules cast with balcony overhangs and floor/ceiling structures to form a deck.

### **Walls**

#### *U.S. Penitentiary housing walls*

The exterior walls of the Penitentiary employ two materials and methods, 1) flat wall panels and 2) exterior concrete panel portion of the pre-cast concrete cell module.

#### *Federal Prison Camp housing walls*

Walls are constructed using pre-engineered metal building systems with bent frame steel structures.

#### *Other Walls*

Central Utility Plant, Garage & Landscape Shop, Unicorn Warehouse and General Food warehouse use pre-engineered metal building systems for the exterior, covered by CMU.

## **Roofs**

Metal roofing on pre-engineered steel support framing and re-roof technologies, and single membrane low pitched flat roofs are used throughout the facility. Roof slopes and configurations were designed to enhance visibility.

## **Doors and Windows**

The windows in the housing buildings were installed in conformance with security standards, are cast into the concrete panels and cell modules, and include bars if the width exceeds 125 mm. All exterior fenestrations follow the Federal Bureau of Prisons Technical Design Guidelines. Certain areas in buildings outside the secure perimeter of the facility have glazing that meets forced entry resistance requirements.

## **Foundation**

A primary goal of the foundation system is to keep the water content of the soils from changing, given the susceptibility of the native soils to soil collapse, which can cause building settlement. In these areas, existing soils were over-excavated. During geotechnical study of the site, neither groundwater nor bedrock was encountered, allowing conventional shallow foundations.

## **Central Utility Plant**

The Central Utility Plant distributes hot and chilled water to all buildings on site, except guard towers and other small or isolated buildings. The heating plant consists of three combination natural gas/No. 2 oil-fired flexible water tube hot water boilers. Each boiler is sized for 50 percent of the heating load, with one unit always on standby. No. 2 oil will fire the boilers in the event of a natural gas failure or if the local gas utility provides a rate that would provide substantial savings under an interruptible rate schedule.

Three chillers are each sized to 40 percent of the design-cooling load and are located in the Central Utility plant. The supply ductwork for heating and cooling includes acoustically-lined sound boots at each return air grille from the cell into the chase to limit communication between cells. Round spiral ducts are used wherever possible for their uniform insulation and lower leakage. Access panels are provided to the ductwork at fire and smoke dampers, volume dampers and at 15-foot intervals.

Two 15 kv, 2000 kw diesel generators will be able to carry 100% of the total electrical load, with the exception of the chillers and associated HVAC in the Central Utility Plant and the Unicor factory load. The fuel tanks are sized for a minimum of 72 hours of operation at full load.

## **Lighting**

Exterior lighting meets Tucson's "Dark Sky" requirements, minimizing the light emitted upward that can cause adverse environmental impacts including hampering astronomy. High mast lighting for the secure compound is full cut-off type and is manually controlled from the Administration Building outside the perimeter fence.

## **Controls**

Central control in the outside administration building is responsible for all operational control and monitoring. Main touchscreen control stations and hard panel control stations at remote locations work together. Programmable logic controls are used to handle tasks remotely including door and cell door locks, motion detectors, paging, inmate duress systems, etc. Fiber optic cable is used for communication between adjacent buildings and all event data is compiled in an information management computer that can be used by staff to prepare reports.

## **Monitoring**

Video cameras monitor all remotely operated doors and gates not within direct view of Central Control. Video signals are transmitted to the Administration Building outside the perimeter fence. The perimeter detection system acts as an electronic barrier using taut wire and microwave technology to create a detection envelope around the facility. Fence alarms are transmitted from fence sensors to Central Control via a fault tolerant, self-healing fiber optic ring.

Construction Completion: 4/2005

Construction Cost: \$112,820,000

**Federal Correctional Institution and Federal Prison Camp  
Mendota, California**



The Federal Correctional Institution (FCI) is a medium-security facility with living units and support areas for 1,152 inmates. With a total gross building area of approximately 55,000-square-meters, the FCI will contain support buildings, a Federal Prison Industries, Inc. (UNICOR) factory, and three four-level housing buildings within a secure compound. An administration building, central utility plant, warehouses, garage/maintenance buildings, wastewater screening building, and water storage tank will be located outside the secure compound. Utility connection points for a future staff training area and firing range will also be provided.

A minimum-security Federal Prison Camp (FPC), with living units and support facilities for 128 inmates, will be located outside the secure compound. Its total gross building area will be 3,400-square-meters. Like the FCI, utility connection points will be included for future housing units.

Newer technology, such as a geothermal heat pump system located in the mechanical rooms, will be used to achieve energy savings in the less secure FPC. Air handlers will also be housed in mechanical rooms. These variable-volume, triple-deck, multi-zone, handlers will be arranged so simultaneous heating and cooling does not occur.

A more conventional central plant containing three boilers, chillers, and cooling towers will serve the higher security FCI. The central plant also contains variable-speed redundant pumps designed in a primary and secondary pumping arrangement. Additionally, a two-generator emergency power system will serve the FCI and FPC.

The entire site of the project is within a sensitive earthquake area, where soil is subject to liquidification during a seismic event. To offset the risk of damage to critical buildings and utilities during an earthquake, e-quake drains will be used to relieve pressure caused by earthquake conditions, thus limiting the effects of soil liquidification.

In addition to using environmental-friendly building materials, the finished project will enable water conservation through various means. Water conservation will be achieved, in part, through efficient plumbing systems and waterless urinals. Because the buildings will not have internal roof drains, external gutters and downspouts will be used to drain water into an extensive stormwater system. Selection of landscape vegetation will be based on plants' ability to survive in a dry environment without the support of an irrigation system.

The FCI and FPC are owned and operated by the Federal Bureau of Prisons (FBOP).

Construction Completion Date: 05/2007

Construction Cost: \$192,000,000

### Federal Correctional Institution and Federal Prison Camp Salters, SC



Federal Correctional Institution Williamsburg, located in Salters, South Carolina, is a new medium security Federal Correctional Institution (FCI) with 1152 beds, including a 128-bed Federal Prison Camp (FPC). For this 485,000-square-foot FCI, HSMM provided HVAC, plumbing and electrical engineering design services under a design-build contract with **Hensel Phelps Construction Company**. HSMM also performed civil engineering design services under a sub-contract to the Project Architect, HOK.

HSMM designed comprehensive utilities and provided civil engineering services for FCI Williamsburg. Water utilities include a 10-inch main loop through the site; HSMM also provided required fire hydrant spacing and location. A site loop was designed to provide necessary fire protection flows to each building.

Five stormwater management ponds as well as catch basins, open swales, reinforced concrete pipe culverts and ditches were designed to drain the site. Earthwork and grading were completed to balance the site and maintain positive drainage. In addition, HSMM designed all temporary erosion and sediment control measures using perimeter silt fence, temporary diversion dykes, sediment traps and sediment basins.

HSMM routed the natural gas distribution system and electrical duct bank through the site. The natural gas system is primarily comprised of 4- and 6-inch lines, with smaller sizes providing services to the building.

HVAC, electrical and plumbing systems designed by HSMM included a primary/secondary heating and cooling piping and variable speed pumping system, variable air volume and multizone air distribution systems, DDC controls, water and sewer utilities, power and lighting, emergency power, lightning protection and the fire alarm and communications portions of Division 17-Security Electronics. Total land development incorporates over 200 acres.

HSMM worked closely with local agencies and review boards in order to obtain applicable permits and approvals; and coordinated with the City of Salters to obtain water distribution and sanitary sewer permits and with the South Carolina Department of Health and Environmental Control for stormwater management and erosion and sediment control permits.

Construction Completion: 6/2003



Construction Cost: \$100,000,000

## Federal Correctional Institution and Federal Prison Camp Bennettsville, SC



Located in Bennettsville, South Carolina, Federal Correctional Institution Bennettsville is a new 485,000-square-foot medium security Federal Correctional Institution (FCI) with 1152 beds, including a 128-bed Federal Prison Camp (FPC). HSMM performed the HVAC, civil, plumbing and electrical engineering designs under a design-build contract with **Hensel Phelps Construction Company**.

The design work was accomplished in two packages with preliminary and final submittals for each. Package A consisted of General Housing Buildings H1, H2 and H3, central utility plant, special housing building, outside administration building, shared warehouses, sewage screening building and site utilities. Package B consisted of the FPC buildings, firing range, inside administration, food service, laundry, visitation, health services, garage/landscaping, maintenance shops, and a number of program areas including vocational training factory (UNICOR), education, recreation, and religion. HSMM designed comprehensive utilities and performed additional civil engineering services for FCI Bennettsville. An elevated 500,000- liter water tank provides fire flow and domestic water. HSMM also designed three stormwater management ponds as well as catch basins, open swales, reinforced concrete pipe culverts and ditches to drain the site. Earthwork and grading were completed to balance the site and maintain positive drainage. In addition, HSMM designed all temporary erosion and sediment control measures using perimeter silt fence, temporary diversion dykes, sediment traps and sediment basins. Total land development incorporates over 200 acres.

HSMM worked closely with local agencies and review boards in order to obtain applicable permits and approvals; and coordinated with the City of Bennettsville to obtain water distribution and sanitary sewer permits and with the South Carolina Department of Health and Environmental Control for stormwater management and erosion and sediment control permits.

HVAC, electrical and plumbing systems designed by HSMM include a central primary/ secondary heating and cooling piping and variable speed pumping system, and variable air volume and multizone air distribution systems, DDC controls, water and sewer utilities, power and lighting, emergency power, lightning protection and the fire alarm and communications portions of Division 17-Security Electronics.

The central plant system consisting of redundant chillers, boilers, and generators provides a reliable and energy efficient primary system for the institution. A common utility trench distributes heating and cooling piping, as well as other piping through the campus. Main distribution trenches were routed to minimize piping in secure zones. Power

and communication duct banks were also located along side the utility trenches to organize the complete utility distribution system.

Construction Completion: 3/2004

Construction Cost: \$100,000,000

**U.S. Penitentiary and Prison Camp  
Lee County, Virginia  
Federal Bureau of Prisons**



HSMM provided architectural, engineering and related services for the design and construction of a new United States Penitentiary (1032 inmates capacity) and Minimum Security Satellite Camp (128 inmates capacity) in Lee County, Virginia for the U.S. Department of Justice, Federal Bureau of Prisons. The project includes a minimum-security camp (4,650 m<sup>2</sup> or 50,000 gsf) a high security penitentiary (60,450 m<sup>2</sup> or 650,000 gsf), central shared facilities (3,720 m<sup>2</sup> or 40,000 gsf) and UNICOR factory facility and warehouse facility (8,370 m<sup>2</sup> or 90,000 gsf). The total facility includes housing, administration, education, health services, recreation and visitation facilities, food and laundry services, manufacturing facility, storage facility, and central plant entities.

The A/E services included all architectural, landscape, civil, structural, mechanical, plumbing, electrical, security, electronics, food service, geotechnical, and other services required for a complete design.

In designing the full site, HSMM's team used leading-edge rendering technology to study the effectiveness of the facility's exterior lighting. HSMM's imaging and modeling personnel generated a detailed 3-dimensional computer model of the prison based on CADD drawings. The project designers and FBOP used this computer model to identify potential security problems at the prison site. HSMM created a variety of still renderings of various views. Using computer enhancement, the light generated from each guard tower at night was replicated, showing which areas of the site are in shade and cannot be monitored from the towers.

The site rises over 350 feet in elevation on the side of a mountain and includes wetlands, karst geology, sinkholes, caves, several, archaeologically significant ruins, a cemetery, and two endangered species. A multi-disciplined effort addressed these features in the design process. Site work, including roads, grading, and fencing were included among HSMM's design responsibilities for this Federal Penitentiary project.

In addition to comprehensive design services, HSMM provided complete construction administration services for the project, as well as full-time on-site representation.

Construction Completion: 2001

Construction Cost: \$109,052,700

### **Cellhouse Design U.S. Penitentiary, Marion, Illinois**

The United States Penitentiary in Marion, Illinois is a 500-bed federal maximum-security facility for male offenders. The Federal Bureau of Prisons in Kansas City, Missouri commissioned Design Architects, Inc. from Marion, Illinois to design a 256-bed, two-story addition to prevent overcrowding.

The new addition provides 100,000 square feet of floor area constructed of precast and cast-in-place concrete and steel to coordinate with the existing structures of the penitentiary. The cells were delivered to the site prefabricated. The design also included two recreation yards that serve the four dayrooms in the addition.

Under subcontract to Design Architects, HSMM was responsible for mechanical, electrical and plumbing design, as well as construction administration services for the addition. Detailed building systems work included

- Water and sewer utilities,
- Security,
- Plumbing fixtures,
- Hydronic heating,
- Chilled water and direct expansion cooling systems,
- Smoke control,
- Fire alarm and detection,
- Power, and
- Interior and exterior lighting.

The project included programming, design development, construction documents, bidding and construction phase services.

Construction Completion: 2003

Construction Cost: \$21,700,000